

Notice of Allowability

Application No.

09/992,480

Examiner

Anthony J. Daniels

Applicant(s)

LIU ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on 3/29/2005.
1, 3-19, 21, 24, 26-42
2. ☒ The allowed claim(s) is/are ~~1-37~~ (Claims are renumbered as 1-37, respectively.).
3. ☒ The drawings filed on 13 November 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


NGOC YEN VU
PRIMARY EXAMINER

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Katharina Schuster on 6/24/2005.

2. The application has been amended as follows:

Claim 1: (Currently Amended) A method for preventing motion/saturation from corrupting image capturing during a global exposure time of a sensor, comprising: performing for each pixel of said sensor: a) determining a difference between an illumination measurement obtained during current image capturing and an illumination estimation generated during previous image capturing; b) comparing said difference with a threshold value; c) determining, based on step b), whether motion/saturation has occurred; ~~and~~ d1) accepting said illumination measurement and updating said illumination estimation if motion/saturation has not occurred; d2) updating said illumination estimation with said illumination measurement if motion/saturation has occurred but terminating said performing act is deferred; and d3) terminating said performing act and outputting said illumination estimation as final illumination estimation if motion/saturation has occurred.

Claim 2: (Cancelled)

Claim 22: (Currently Amended) A method for synthesizing from multiple captures high dynamic range motion blur free images, said method comprising the steps of: a) capturing a first image sample; b) generating for each pixel a current illumination estimation based on said first captured image sample; c) capturing a next image sample; d) determining for each pixel whether motion/saturation has occurred and whether to include said next image sample; d1) if motion/saturation has occurred, using said current illumination as final illumination estimation; and d2) if no motion/saturation has occurred or a decision is deferred, including said next image sample and updating said current illumination; e) repeat steps c) and d) until no more image samples are to be captured.

Claim 23: (Cancelled)

Claim 24: (Currently Amended) A system having a sensor capable of capturing a multiplicity of image samples during a global exposure time, comprising: motion/saturation detecting means for determining for each pixel whether motion/saturation has occurred between a previous capturing and a current capturing by determining for each pixel a difference between an illumination measurement obtained during said current capturing and an illumination estimation generated during said previous capturing and comparing for each pixel said difference with a threshold value; processing means for determining for each pixel whether to accept an image sample captured during said current capturing; estimating means for generating an ~~optimal~~ illumination estimation for said sensor based on selectively accepted multiplicity of image samples captured during said global exposure time ~~thereby preventing motion/saturation from corrupting image capturing~~ by updating for each pixel said illumination estimation with an accepted or deferred illumination measurement; and means for outputting for each pixel a final

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optimal illumination estimation thereby preventing motion/saturation from corrupting image capturing.

Claim 25: (Cancelled)

Claim 26: The system of claim 25 24, wherein said threshold value is generated based on a predetermined parameter and a prediction variable, said predetermined parameter is configured to achieve desired tradeoff between signal-to-noise ratio and motion blur.

Claim 27: The system of claim 25 24, wherein said threshold value is characterized by a first range of values and a second range of values that include said first range of values, wherein said first range of values is characterized by a first constant parameter m_1 and said second range of values is characterized by a second constant parameter m_2 where $0 < m_1 < m_2$, and wherein m_1 , m_2 , and length of global exposure time are chosen so to achieve a desirable balance between highest possible signal-to-noise ratio and least possible motion blur.

Allowable Subject Matter

3. Claims 1,3-19,22,24,26-42 allowed.

The following is a statement of reasons for the indication of allowable subject matter: As to claim 1, the prior art of record does not teach or fairly suggest a method for preventing motion/saturation from corrupting image capturing during a global exposure time of a sensor, comprising the steps of: a) determining a difference between an illumination measurement obtained during current image capturing and an illumination estimation generated during previous image capturing; b) comparing said difference with a threshold value; c) determining, based on step b), whether motion/saturation has occurred; d) accepting said illumination

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measurement and updating said illumination estimation if motion/saturation has not occurred; d2) updating said illumination estimation with said illumination measurement if motion/saturation has occurred but terminating said performing act is deferred; and d3) terminating said performing act and outputting said illumination estimation as final illumination estimation if motion/saturation has occurred. As to claims **22,24**, claims 22,24 are apparatus claims corresponding to the method claim 1. They are allowable for the same reasons.

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

As to **6,590,611**, Ishida et al. teaches determining for each pixel a difference between a current and previous pixel capture, comparing the difference with a threshold, and determining from the comparison whether an object being captured has moved, with no intention of preventing motion/saturation from corrupting image capturing.

As to **5,926,212**, Kondo teaches determining for each pixel a difference between a current and previous pixel capture, comparing the sum of the differences of the pixels with a threshold, and determining from the comparison whether camera shake has occurred.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Daniels whose telephone number is (571) 272-7362. The examiner can normally be reached on 8:00 A.M. - 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AD
6/26/2005


NGOC-YEN VU
PRIMARY EXAMINER